

REMARKS/ARGUMENTS

Claims 1-20 are pending in the application. Claims 3, 9, 12, and 18 are amended and Claims 19 and 20 are added. No claims have been canceled. The amendments to the claims as indicated herein do not add any new matter to this application. Furthermore, amendments made to the claims as indicated herein have been made to exclusively improve readability and clarity of the claims and not for the purpose of overcoming alleged prior art.

ALLOWABILITY OF CLAIMS

The indicated allowability of Claims 5 and 14 is gratefully acknowledged. These claims have not been rewritten in independent form at this time however, because it is believed that all of the pending claims are patentable over the references cited and relied upon for at least the reasons set forth hereinafter.

CLAIM REJECTIONS—35 U.S.C. § 103

Claims 1-3, 6-12 and 15-18 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over applicants' background, specification page 1, paragraph [004] to page 9, paragraph [0028], (Applicants' Admitted Prior Art) ("APA") in view of U.S. Patent 5,485,608 issued to Lomet et al. ("*Lomet*"). Applicants respectfully traversed.

THE CITED ART DOES NOT TEACH OR DISCLOSE EACH LIMITATION OF THE PENDING CLAIMS

Even if the cited art were to be properly combined, each of the pending claims recites at least one element that is not disclosed, taught, or suggested by the cited art, either individually or in combination.

Claim 1

Claim 1 recites:

“storing a checkpoint value that indicates which records of a plurality of records have to be processed after the failure, wherein the plurality of records indicate changes for a plurality of data blocks; and
writing changes from volatile memory to nonvolatile memory to advance the checkpoint value based on a user-specified value that corresponds to how much work will be required during a redo phase of recovery.”
(emphasis added)

At least the above-bolded element of Claim 1 is not disclosed, taught, or suggested by *APA* or *Lomet*, either individually, or in combination.

Lomet fails to disclose the limitation in Claim 1 of “writing changes from volatile memory to nonvolatile memory to advance the checkpoint value based on a user-specified value that corresponds to how much work will be required during a redo phase of recovery.” The Office Action admits that the “*APA* fails to explicitly disclose” this limitation.

There is no teaching or suggestion anywhere in *Lomet* of writing changes from volatile memory to nonvolatile memory based on a user-specified value that corresponds to how much work will be required during a redo phase of recovery. Rather, the sections identified by the Office Action disclose the purpose and method of an analysis phase (Col. 20, lines 32-44), writing undo records for transactions greater than the NEXT attribute (Col. 21, lines 12-20), and the undo phase requiring concurrency control (Col. 22, lines 31-36).

In *Lomet*, the analysis phase is an optional method to reduce unnecessary work during recovery phases. In order to perform the analysis, “the last complete checkpoint on the RLOG [redo log] is read and used to initialize the values for the Dirty Blocks table 900 (FIG. 9) and Active Transactions table 1200 (FIG. 12). RLOG records following this last checkpoint are then read.” (Col. 20, lines 38-45). Though a checkpoint is disclosed, *Lomet* fails to discuss or suggest

advancing the checkpoint based on a *user-specified value that corresponds to how much work will be required during a redo phase of recovery*, let alone writing changes from volatile memory to non-volatile memory to advance the checkpoint based on such a user-specified value.

The cited sections in *Lomet* on undo records and the undo phase (Col. 21, lines 12-20) and (Col. 22, lines 31-36) are with respect to undo operations that have already been performed on various records. Nothing in these sections discuss or suggest any *user-specified value that corresponds to how much work will be required during a redo phase of recovery*. Consequently, the element of “writing changes from volatile memory to nonvolatile memory to advance the checkpoint value based on a user-specified value that corresponds to how much work will be required during a redo phase of recovery” is not disclosed, taught, or suggested by *Lomet*.

As at least one element is not disclosed, taught, or suggested by the *APA* or *Lomet*, either individually or in combination, it is respectfully submitted that Claim 1 is patentable over the cited art and is in condition for allowance.

Claim 9

Claim 9 recites:

“storing a checkpoint value that indicates which records of a plurality of records have to be processed after the failure, wherein the plurality of records indicate changes for a plurality of data blocks;
determining a required recovery time, wherein the required recovery time indicates a maximum length of time that is to be allowed for recovering after said database system failure; and
writing changes from volatile memory to nonvolatile memory to advance the checkpoint value based on a maximum number of data block reads that can be performed in the required recovery time.” (emphasis added)

At least the above-bolded element of Claim 9 is not disclosed, taught, or suggested by *APA or Lomet*, either individually, or in combination.

Lomet fails to disclose the limitation in Claim 9 of “writing changes from volatile memory to nonvolatile memory to advance the checkpoint value based on a maximum number of data block reads that can be performed in the required recovery time.” The Office Action admits that the “APA fails to explicitly disclose” this limitation.

There is no teaching or suggestion anywhere in *Lomet* of writing changes from volatile memory to nonvolatile memory based on a maximum number of data block reads that can be performed in the required recovery time. Rather, the sections identified by the Office Action disclose the use of checkpoints in a redo log (Col. 13, lines 59-61) and the advantages of using N-log undo at recovery time (Col. 14, lines 62-67).

Lomet states “Checkpoints provide a major advantage of a pure RLOG which is that the system has explicit control over the size of the redo log and hence the time required for redo recovery.” (Col. 13, lines 59-61). Though *Lomet* teaches the use of checkpoints and the size of the redo log, “advancing a checkpoint based upon a maximum number of data block reads that can be performed in the required recovery time” is not taught or disclosed. In fact, there is no mention of basing the checkpoint based on a maximum number of data block reads, let alone writing changes from volatile memory to non-volatile memory to advance such a checkpoint value.

The cited section in *Lomet* on the impact of system performance of N-log undo at recovery time (Col. 14, lines 62-67) does not discuss or suggest any *checkpoint value based on a maximum number of data block reads that can be performed in the required recovery time.* Consequently, the element of “writing changes from volatile memory to nonvolatile memory to

advance the checkpoint value based on a maximum number of data block reads that can be performed in the required recovery time” is not disclosed, taught, or suggested by *Lomet*.

As at least one element is not disclosed, taught, or suggested by the *APA* or *Lomet*, either individually or in combination, it is respectfully submitted that Claim 9 is patentable over the cited art and is in condition for allowance.

Claims 2-8 and 10-18

Claims 4 and 13 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over “background, specification page1, paragraph [0004] to page 9, paragraph [0028]” in view of *Lomet* as applied to claims 1-3, 6-12 and 15-18 and in further view of “ARIES-RRH: restricted repeating of history in the ARIES transaction recovery method” by to Mohan (“*Mohan*”). This rejection is respectfully traversed.

Claims 10 and 18 feature limitations similar to those discussed above with respect to Claims 1 and 9 respectively, except that Claims 10 and 18 are recited in computer-readable medium format. Consequently, for at least the reasons given above with respect to Claims 1 and 9, it is respectfully submitted that Claims 10 and 18 are patentable over the cited art and are each in condition for allowance.

Claims 2-8, 10-17, and 19-20 are dependent claims, each of which depends (directly or indirectly) on one of the claims discussed above. Each of Claims 2-8, 10-17, and 19-20 is therefore allowable for the reasons given above for the claim on which it depends. In addition, each of Claims 2-8, 10-17, and 19-20 introduces one or more additional limitations that independently render it patentable. However, due to the fundamental differences already identified, to expedite the positive resolution of this case a separate discussion of those

limitations is not included at this time, although the Applicants reserve the right to further point out the differences between the cited art and the novel features recited in the dependent claims.

CONCLUSION

For the reasons set forth above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a formal Notice of Allowance is believed next in order, and that action is most earnestly solicited.

The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

Please charge any shortages or credit any overages to Deposit Account No. 50-1302.

Respectfully submitted,

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